REMARKS

Claims 4-7 are pending and under consideration. Reconsideration is requested.

Item 4: Drawings

In item 2 of the Office Action, the Examiner asserts that:

> [T]he subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81(c).

(See, Action at page 2, lines 10-12).

Applicants point out that the subject application was filed under 35 U.S.C. 371. Accordingly, Applicants submit that the drawings for the subject application, i.e., Figs. 1-6 were properly filed as included in published International Application No. PCT/DE2004/001455, a copy of which was filed along with the substitute specification on January 17, 2006.

Thus, acceptance of the drawings is requested.

Item 5: Allowable Subject Matter

In item 5 of the Office Action, the Examiner objects to claim 5 as being dependent upon a rejected base claim, but indicates it would be allowable if rewritten in independent form. (See, Action at page 3, lines 2-4).

Applicants appreciate the indication of allowable subject matter.

Claim 5 is not rewritten herein since Applicants submit that patentablity resides in parent independent claim 4 from which claim 5 depends.

Item 7: Rejection of claims 4-7 under 35 U.S.C. §101

In item 7 of the Office Action, the Examiner rejects claims 4-7 under 35 U.S.C. §101 as not falling within one of the four statutory categories of invention. The Examiner asserts that

> The instant claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

(See, Office Action at page 3, lines 18-21).

Applicants submit that independent claim 4 recites, for example, a method including "including interference symbols in the digital broadcast channel superimposed on the data symbols a_k and periodic multiple representation thereof due to cross-coupled user signals by an adapted periodic multiple representation . . . ; and eliminating the interference symbols by the K receive-side modulo decision devices." (Emphasis added).

That is, there is a transformation of the underlying subject matter by including interference symbols in the digital broadcast channel superimposed on the data symbols and eliminating the interference symbols by the K receive-side modulo decision devices.

Accordingly, Applicants submit that independent claim 4 (and dependent claims 5-7) comply with 35 U.S.C. §101.

Thus, withdrawal of the rejection is requested.

Item 9: Rejection under of claims 4 and 6-7 under 35 U.S.C. §103(a)

In item 9 of the Office Action, the Examiner rejects independent claim 4 and dependent claims 6-7 under 35 U.S.C. §103(a) as being unpatentable over Yu et. al, "Trellis Precoding for the Broadcast Channel" published in 2001, pages 1344-1348 ("Yu") in view of Yao et. al., "Lattice-Reduction-Aided Detectors for MIMO Communication Systems" published in 2002, pages 424-428 ("Yao").

The rejection is traversed. Independent claim 4 recites a "nonlinear precoding method based on modulo arithmetic for the transmit-side preequalization of K user signals to be transmitted concurrently using a frequency in a digital broadcast channel with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations, the user signals consisting of data symbols a_k with k from 1 to K from a signal constellation having M_k levels and a signal point spacing A_k with a periodic multiple representation of the undisturbedly transmitted data symbols a_k in data symbol intervals congruent for K receive-side modulo decision devices, a transmit-power-minimizing selection of representatives v_k from the range of values $a_k+A_k \cdot M_k \cdot z_{kk}$ where z_{kk} are integers, and linear preequalization of the selected representatives v_k to form transmit signals x_k to be transmitted, comprising: including interference symbols in the digital broadcast channel superimposed on the data symbols a_k and periodic multiple representation thereof due to cross-coupled user signals by an adapted periodic multiple representation, the interference symbols between the data symbol a_l with l from 1 to K and not equal to k and the data symbol a_k being assigned periodic representatives from a range of values $A_k \cdot M_k \cdot z_{lk}$ where z_{lk} are integers; and eliminating the interference symbols by the K receive-side modulo decision devices." (Emphasis added).

That is, according to an exemplary embodiment, a method includes a partial precoding (pre-equalizing), i.e., the mutual interferences are not completely pre-equalized at the transmitter station and there are residual (remaining) interference signals at the receiver station. Further, the partial precoding can be selected such that the residual interference at the receivers does

not adversely affect independent decision making in the independent receivers.

Applicants submit that all of the features recited by independent claim 4 are not taught by a reasonable *arguendo* modification of the art of record.

The Action concedes that Yu does not teach "eliminating the interference symbols by the K receive-side modulo decision devices." (See, Office action at page 6, lines 9-10).

However, the Examiner asserts that:

> Yao teaches a receiver that detects a transmitted signal and has predetermined knowledge of the channel, in order to eliminate "interference symbols.". . . obvious ,. . . to combine the teachings of Yu with the teachings of Yao because Yao mitigates the effects of multiuser detection problems such as interference in a MIMO system, thereby enhancing the performance of a multi-user communication system as detailed in page 424, col. 1.

(See, Office action at page 6, lines 11-19).

Applicants submit, however, that Yu merely teaches a Tomlinson-Harashima precoding. (See, for example, page 1346, col. 2, starting at line 5). Applicants submit that as understood by one of ordinary skill in the art, a disadvantage of such a precoding method is that no "diversity gain" can be achieved because of the complete prevention (pre-equalizing) of mutual interference signals. That is, each transmission subsystem (one user signal to the associated receiver) functions as if It is operated via a separate channel (with one input and output), e.g., in a case of fading channels involving a high error rate at times of poor transmission conditions.

Further, Yu merely teaches a Trellis precoding as:

> A vector quantization-based precoder is shown in figure 4. . . . First, a codeword sequence is generated by an error- correcting code. The additive interference sequence sk is pre-subtracted from the codeword, and the difference sequence is then quantized by a vector quantizer. The quantization noise is sent as the input to the channel. The channel adds the interference and noise. At the decoder, the received sequence *is* first quantized by the same quantizer.

(See, for example, Fig. 4, and page 1347).

That is, Yu merely teaches a precoding method where a diversity gain can hardly be achieved because the mutual interference signals are also pre-equalized.

Applicants submit that one of ordinary skill would not reasonably modify Yu with teaching of Yao. For example, Yao teaches "the case in which the channel matrix H is effectively known at the receiver but not at the transmitter. (See, for example, page 424, col. 1, lines 30-33).

But, an exemplary embodiment includes a multiuser system with an exclusive downlink direction including "between a central transmitting station and K decentralized, non-

interconnected receiving stations," as recited by claim 4. That is a common transmitter, e.g., in which user signals can be processed, but having "decentralized, non-interconnected" receivers scattered over a service area that cannot cooperate, i.e., each receiver sees only its own receive signal.

By contrast with the recitation of claim 4, Yao merely teaches a method applying to a multi-antenna system, e.g., two transmitting and two receiving antennas system in which all the user receive signals are known on the receive side (channel matrix H Is known at the receiver side) and joint signal processing is possible.

Accordingly, Applicants submit that a reasonable modification of the art of record does not teach a "precoding" method for the "transmit-side preequalization of K user signals to be transmitted concurrently using a frequency in a digital broadcast channel with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations . . and linear preequalization of the selected representatives v_k to form transmit signals x_k to be transmitted, comprising: including interference symbols in the digital broadcast channel superimposed on the data symbols a_k and periodic multiple representation thereof due to cross-coupled user signals by an adapted periodic multiple representation . . ." as recited by claim 4, for example. (Emphasis added).

Thus, the rejection to independent claim 4 should be withdrawn.

* * *

Dependent claims 6-7 inherit the patentable recitations of base claim 4, and therefore, patentably distinguish over the cited art for at least the reason discussed above. Thus, the rejection to claims 6-7 should be withdrawn.

Conclusion

Since features recited by independent claim 4 (and dependent claims 6-7) are not taught by even a reasonable *arguendo* combination of the art relied on by the Examiner, the rejection should be withdrawn and claims 4 and 6-7 allowed.

Conclusion

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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